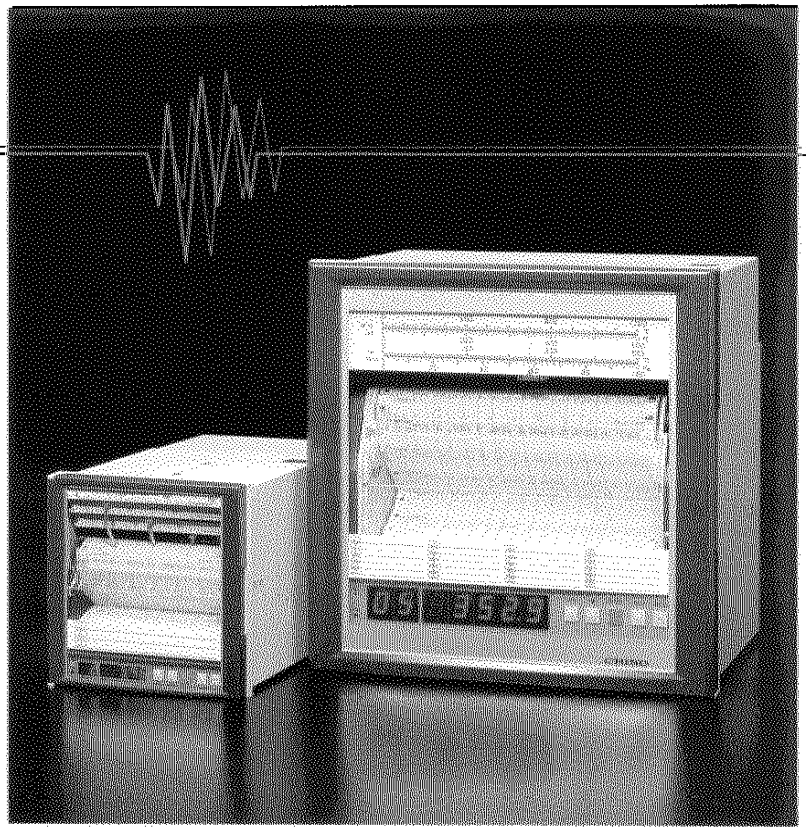
# BL-3H SERIES

100mm Chart 180mm Chart

## HYBRID RECORDERS



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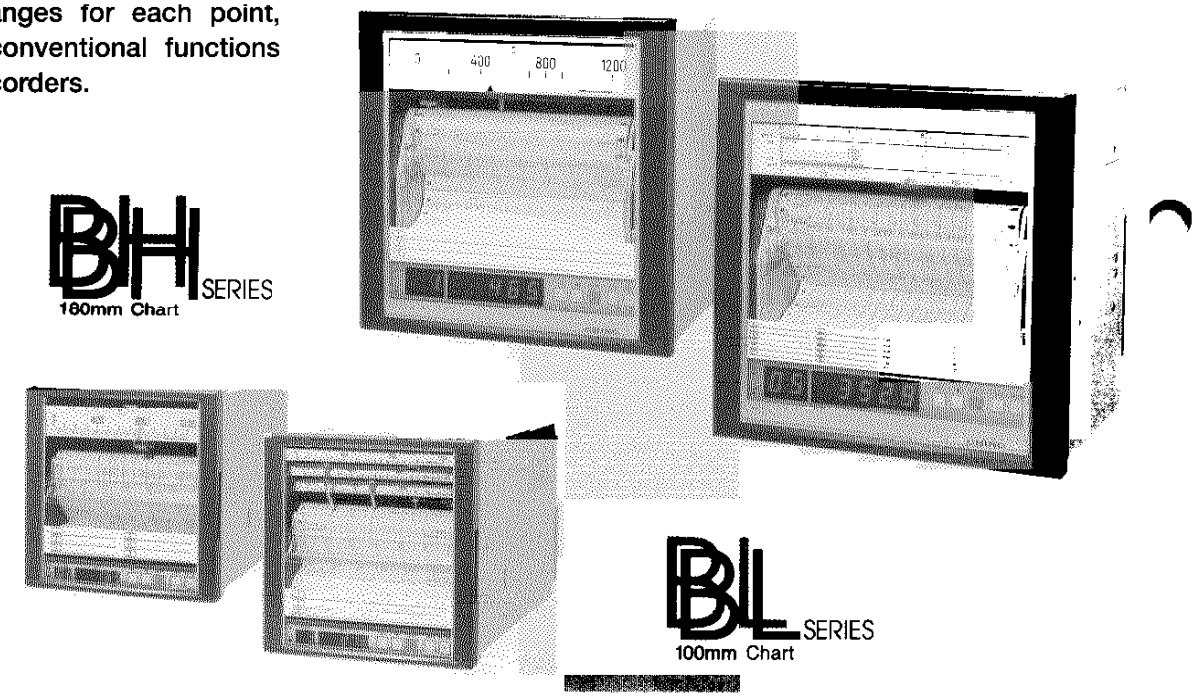
# Easy operation as conventional ana

**The hybrid recorders with easy-to-operate features as analog recorders comprise dotting type (6-point for BL series, 6, 12 and 24-point for BH series) and pen type (1 to 4-pen for BL series, 1 to 3-pen for BH series). Scale plates conforming to input types and measuring ranges as well as digital displays are provided with the recorders to be able to read measured values directly at a glance. The compact and lightweight recorders with depth of only 195mm (6-point dotting and 1-pen types) offer analog/digital recording function, individual ranges for each point, and other conventional functions as hybrid recorders.**




## GENERAL SPECIFICATIONS

Input signal: DC voltage ..... ±7mV, ±14mV, ±25mV, ±70mV, ±5V
DC current ..... Applicable by adding shunt resistors (100Ω, 250Ω)
Thermocouple .. B, R, S, K, E, J, T, N, Ni-NiMo, AuFe-Cr, PR5-20, PR20-40, WWRe5-26, WWRe0-26, Platinel, U, L
Resistance thermometer ..... Pt100, JPt100, Pt-Co
(Specify from the standard scale table for every input point.)

Accuracy rating: Digital indication, printing
Thermocouple, resistance thermometer ..... ±0.3% of scale range ±1 digit or ±1°C, whichever larger
DC voltage ..... ±0.2% of reference measuring range ±1 digit (BL)
±0.1% of reference measuring range ±1 digit (BH)
Analog indication .... ±0.5% of scale range
[At 23°C ± 2°C, Reference junction compensating accuracy is excluded for thermocouple input.]

Temperature drift: ±0.01% of full scale/°C (equivalent to E.M.F. for thermocouple input)

Reference junction compensating accuracy:
K, E, J, T, N, Platinel ..... lower than ±0.5°C
R, S, Ni-NiMo, AuFe-Cr, WWRe5-26, WWRe0-26, U, L ..... lower than ±1.0°C

A/D resolution: About 1/18000

Allowable signal source resistance:
Thermocouple input, DC voltage input ..... lower than 1kΩ (without burnout)
Resistance thermometer input ..... Lower than 10Ω per wire (Pt100, JPt100)

Input resistance: Thermocouple input, DC voltage input ..... About 8MΩ (About 1MΩ when voltage divider is used.)

Common mode rejection ratio:
More than 130dB

Series mode rejection ratio:
More than 50dB

Terminal board: Detachable type, removable for wirings

Chart paper: BL - Fan-fold type, 114mm total width, 10m total length, 100mm effective recording width
BH - Fan-fold type, 200mm total width, 20m total length, 180mm effective recording width

Analog indication: Scale plates and pointers

Status display: Recording ON/OFF ... Green LED illumination switch
ALM ..... Red LED flickers when alarms occurred.
PRT ..... Green LED lights during printing. (dotting type)
PW ..... Green LED lights when power supply is turned on.

Digital display: 7-segment LED, character height 7mm (BL), 15mm (BH)
2 digits .... Point No.
5 digits .... Data display -9999 to 99999

Display items: Multi-point sequential display, one-point continuous display or time display is selectable.

# og recorders with various functions!!!

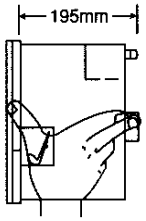
## FEATURES

### Ready to run

As the recorders are preset to meet individual customers' specifications and precise application requirements, the recorders start to run as soon as the power is switched on.

### Compact size

Compact size with depth of 195mm (6-point dotting and 1-pen types) and lightweight (BL dotting type - about 2.6kg, BH dotting type - about 7.0kg)




### Analog scale conforming to measuring input and digital display

Measured values can be directly read at a glance on analog scales (maximum 3-multi-scale on BL dotting type, maximum 6-multi-scale on BH dotting type) and digital displays.

Analog

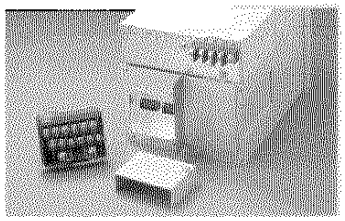
Digital

### CE-marking (option)

Models with CE-marking (industrial environment) are provided.

### Detachable terminal board for easy wiring

Detachable terminal boards are provided to enable convenient on-site connection of cables.



### ıput signal shift function

Shift correction of indication can be done every input according to sensor input signals.

## LIST OF FUNCTIONS

| Functions | Description |
|---|---|
| Fixed time recording | Time, point No., measured value and units are printed on analog recording at every specified time interval. |
| Data printing | Time, point No., measured value and units are printed at the request time by interrupting analog recording. |
| Date and time printing | Hour line and time are printed on every hour sharp. Date (year/month/day) is printed at zero hour sharp. |
| Scale and point No. printing | Scale range and point No. beside analog recording are printed. |

Setting mode display: Digital display part is commonly used by key operation. Data printing operation, chart speed setting, time setting, alarm setting (when alarm option is added), data interval setting, skip setting
Rated power supply: 90 to 120VAC or 180 to 240VAC (to be specified)
Rated supply frequency: 50Hz/60Hz (selectable by DIP switch)
Working temperature range: 0 to 50°C
Working humidity range: 20 to 80%RH (No condensing is allowed.)
Countermeasure against power interruption: Setting data are kept unerased by EEPROM. Clock is backed up for longer than 10 years (at 8-hour operation/day) by a lithium battery (soldering).
Casing: Door ..... ABS resin (heat-resisting temperature - max. 80°C)
Rear casing .... ABS resin (heat resisting temperature - max. 80°C) (Steel plate for pen type)
Power supply .... Steel plate
Color: Door ..... Black (equivalent to Munsell code N3.0)
Rear casing ..... Gray (equivalent to Munsell N7.0)
Mounting method: Panel flush-mount

**DOTTING TYPE SPECIFICATIONS**

No. of measuring point: BL - 6 points
BH - 6, 12, 24 points
Measuring cycle: BL - 6 points/about 5 sec.
BH - 6 points/about 5 sec., 12 points/about 10 sec., 24 points/about 20 sec.
Dotting interval: About 5 sec./point (when chart speed is faster than 6mm/h)
Recording system: Wire-dot system 6-color ribbon
Recording color: Analog recording - Red, black, blue, green, brown, purple
Digital recording - Repetition of 6 colors (red, black, blue, green, brown, purple)
Date (year/month/day) and time printing..... Black
Scale range, point No. ..... Same colors as dotting colors
Chart speed ..... Black
Alarm occurrence & reset printing ..... Red (option)
Setting change mark ..... Black
Scale plate: BL - Max. 3-multi-scale, min. 80 equal divisions
BH - Max. 6-multi-scale, min. 150 equal divisions
Continuous indication: Input entry and continuous indication at specified point only (recording stop)
Chart speed: 1 to 1500mm/h optional setting (BH -12.5mm/h can be set.)
Maximum power consumption: About 45VA
Weight: BL - about 2.6kg, BH - about 7.0kg

## Easy instrumentation with communication interface

Communication interfaces RS-422A, RS-232C and RS-485 are prepared at option. Simple instrumentation systems can be designed by connecting recorders with personal computers and controllers through RS-422A.

## Abundant functions installed

An abundance of easy-to-use functions including skip function, digital recording, year/month/day printing, key lock and 2 linearizers are installed. A variety of options including high-speed-dotting, external drive, alarm output and time-axis synchronization (pen types) are prepared to meet every requirements.

| Functions | Description |
|---|---|
| Chart speed printing | The executing chart speed is printed at the constant interval as well as when the power supply is turned on. |
| Alarm occurrence and reset printing (when alarm option is added) | Time, point No., alarm type and level are printed when an alarm occurred.<br>Time, point No. and level are printed when an alarm was reset. |
| Setting change marks printing | Characters indicating changed parameters are printed at the end of setting change. |
| Skip function | None of analog indication, dot-printing, digital display and printing is done at specified points. |

### PEN TYPE SPECIFICATIONS

No. of measuring point:
1 point (1-pen), 2 points (2-pen), 3 points (3-pen)
Measuring cycle: About 125msec.
Recording system: Analog recording - Cartridge pen
Digital recording - Plotter pen
Recording color: 1-pen type - red
2-pen type - 1st pen .... red, 2nd pen .... green
3-pen type - 1st pen .... red, 2nd pen .... green,
3rd pen .... blue
Chart speed: 1 to 599mm/h , 10 to 200mm/min optional setting
(BH - 12.5mm/h can be set.)
Scale plate: Max. dual-scale (BL - min. 80 divisions, BH - 150 divisions)
Maximum power consumption:
1-pen type - about 30VA, 2-pen type - about 35VA,
3-pen type - about 40VA
Weight: BL - 1-pen type - about 3.0kg, 2-pen type - about 4.0kg,
3-pen type - about 4.5kg
BH - 1-pen type - about 7.8kg, 2-pen type - about 8.5kg,
3-pen type - about 9.0kg

## MODELS

Dotting type

BL
BH □□□□□D□

- Models
  - BL: 100mm hybrid recorders
  - BH: 180mm hybrid recorders
- Input signals
  1. Thermocouple, DC voltage, Single range
  2. Resistance thermometer, Single range
  3. Thermocouple, DC voltage, individual ranges by points
  4. Resistance thermometer, DC voltage (5V), individual ranges by points
- No. of input points
  - 6: 6 points (BL, BH)
  - 2: 12 points (BH)
  - 4: 24 points (BH)
- Individual alarm outputs (option)
  - 0: Not provided (BL, BH)
  - 6: 6 points (BL, BH)
  - 2: 12 points (BH)
  - 4: 24 points (BH)
- CE-marking (option)
  - –: Not provided
  - E: With CE-marking
- Communication interface (option)
  - N: Not provided
  - A: RS-422A
  - R: RS-232C
  - S: RS-485
- External drive (option)
  - N: Not provided
  - D: Provided

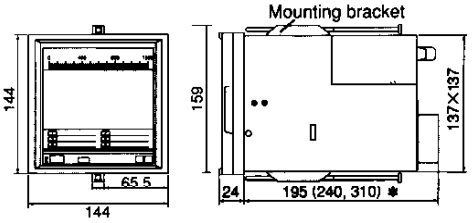
Pen type (1-pen, 2-pen, 3-pen)

RI
BH □□□□□□□□

- Models
  - RI: 100mm hybrid recorders
  - BH: 180mm hybrid recorders
- 1st pen input signals
  1: Thermocouple, DC voltage, Single range
  2: Resistance thermometer, Single range
- No. of input points (No. of pens)
  E: 1 pen F: 2 pens G: 3 pens
- 2nd pen input signals
  0: None (1-pen type)
  1: Thermocouple, DC voltage, Single range
  2: Resistance thermometer, Single range
- 3rd pen input signals
  0: None (1-pen and 2-pen types)
  1: Thermocouple, DC voltage, Single range
  2: Resistance thermometer, Single range
- CE-marking (option)
  –: Not provided
  E: With CE-marking
- Communication interface (option)
  N: Not provided
  A: RS-422A
  R: RS-232C
  S: RS-485
- Time-axis synchronization (option)
  D: Not provided
  2: Provided
- External drive + Individual alarm output (option)
  N: None
  D: External drive
  1: 6 alarm outputs
  2: External drive + 6 alarm outputs

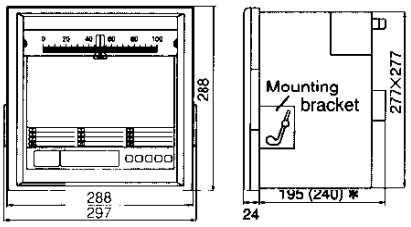
# EXTERNAL DIMENSIONS

**BL series**



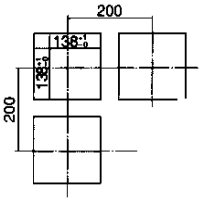

**195** (6-point dotting, 1-pen),/240 (2, 3-pen)/310 (**4-pen**)
**The case length is 16mm longer than the above when the option of external drive, alarm output or communication interface is added.**

**BH series**

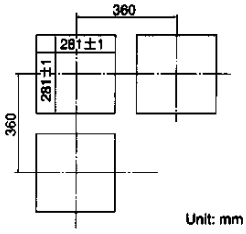



195 (dotting, 1-pen),/240 (2-pen, 3-pen)
The case length is 16mm longer than the above when the option of external drive, alarm output or communication interface is added.

**Panel cutout**
**Minimum instrument mounting space**




**Panel cutout**
**Minimum instrument mounting space**




**Unit: mm**

## STANDARD SCALES

| Input type | | Measuring range | Standard scale |
|---|---|---|---|
| DC voltage/current | | ±7mV<br>±14mV<br>±25mV<br>±70mV<br>±5V | (–) 5 to 5mV, 0 to 5mV<br>(–) 10 to 10mV, 0 to 10mV<br>0 to 20mV<br>0 to 50mV<br>1 to 5V, 4 to 20mA, 10 to 50mA<br>(The scale plate is equally divided into 0 to 100 divisions.) |
| Thermocouple | K | ±7mV | 0 to 100°C, 0 to 150°C, (–) 50 to 100°C<br>(–) 50 to 150°C, (–) 100 to 50°C |
| | | ±14mV | 0 to 200°C, 0 to 250°C, 0 to 300°C<br>(–) 50 to 200°C, (–) 100 to 200°C |
| | | ±25mV | 0 to 400°C, 0 to 500°C, 0 to 600°C |
| | | ±70mV | 0 to 800°C, 0 to 1000°C, 0 to 1200°C |
| | E | ±25mV | 0 to 200°C, 0 to 300°C, (–) 50 to 150°C |
| | | ±70mV | 0 to 500°C, 0 to 600°C, 0 to 800°C |
| | J | ±25mV | 0 to 300°C, 0 to 400°C |
| | | ±70mV | 0 to 600°C, 0 to 800°C, 0 to 1000°C, 0 to 1200°C |
| | T | ±7mV | 0 to 100°C, 0 to 150°C, – 50 to 150°C |
| | | ±14mV | 0 to 200°C, 0 to 250°C |
| | | ±25mV | 0 to 300°C, 0 to 400°C |
| | R | ±25mV | 0 to 1200°C, 0 to 1400°C, 0 to 1600°C |
| | S | ±25mV | 0 to 1400°C, 0 to 1600°C |
| | B | ±14mV | 0 to 1200°C, 0 to 1400°C, 0 to 1600°C |
| | N | ±7mV | 0 to 150°C, 0 to 200°C |
| | | ±14mV | 0 to 300°C |
| | | ±25mV | 0 to 400°C, 0 to 500°C, 0 to 600°C |
| | | ±70mV | 0 to 1000°C, 0 to 1200°C |
| | PR20-40 | ±7mV | 0 to 1600°C |
| | PR5-20 | ±14mV | 0 to 1200°C, 0 to 1400°C, 0 to 1600°C |
| | Ni-NiMo | ±70mV | 0 to 800°C, 0 to 1000°C, 0 to 1200°C |
| | Platinel | ±7mV | 0 to 100°C, 0 to 150°C |
| | | ±14mV | 0 to 200°C, 0 to 250°C, 0 to 300°C |
| | | ±25mV | 0 to 400°C, 0 to 500°C, 0 to 600°C |
| | | ±70mV | 0 to 800°C, 0 to 1000°C, 0 to 1200°C |
| | U | ±7mV | 0 to 100°C, 0 to 150°C |
| | | ±14mV | 0 to 200°C, 0 to 250°C, |
| | | ±25mV | 0 to 300°C, 0 to 400°C |
| | | ±70mV | 0 to 600°C |
| | L | ±25mV | 0 to 300°C, 0 to 400°C |
| | | ±70mV | 0 to 600°C, 0 to 800°C |
| Resistance thermometer | Pt100 | 120Ω | (–) 50 to 50°C, 0 to 50°C |
| | | 140Ω | 0 to 100°C, (–) 20 to 80°C |
| | | 160Ω | 0 to 150°C, (–) 50 to 150°C |
| | | 220Ω | 0 to 200°C, 0 to 300°C |
| | | 340Ω | 0 to 400°C, 0 to 500°C, 0 to 600°C |
| | JPt100 | 120Ω | (–) 50 to 50°C, 0 to 50°C |
| | | 140Ω | 0 to 100°C, (–) 20 to 80°C |
| | | 160Ω | 0 to 150°C, (–) 50 to 150°C |
| | | 220Ω | 0 to 200°C, 0 to 300°C |
| | | 340Ω | 0 to 400°C, 0 to 500°C, 0 to 600°C |

* Select the combinations of input ranges out of the following four kinds in case of individual ranges for each point.

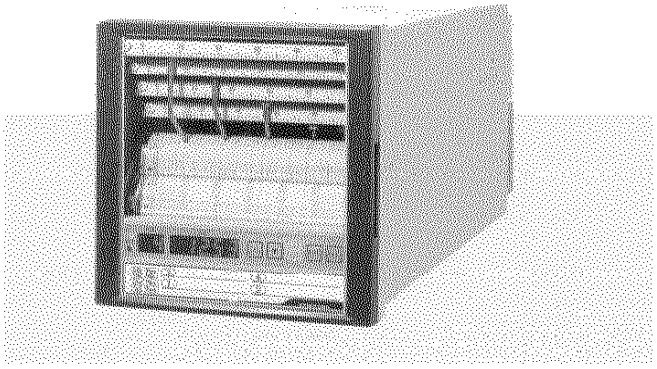
1. Thermocouple, DC voltage type 1: 7mV, 14mV, 25mV, 5V
2. Thermocouple, DC voltage type 2: 14mV, 25mV, 70mV, 5V
3. Resistance thermometer, 5V type 1: 120Ω, 140Ω, 160Ω, 5V
4. Resistance thermometer, 5V type 2: 160Ω, 220Ω, 340Ω, 5V

## OPTIONS

| Options | Contents |
|---|---|
| External drive | The following operation can be done by external contact signals.<br>Operation type: 3-chart speed selection, recording stop and data printing<br>No. of contact points: 3 no-voltage contacts + 1 point (for special request)<br>Contact capacity: 12VDC, 2mA or more |
| Communication interface | RS-232C, RS-422A or RS-485 (to be specified)<br>Communication contents:<br>Transmission of measured values and status information<br>Setting and confirmation of parameters settable by keys |
| Alarm output | No. of output point - 6 points<br>Alarm type: Absolute value alarm, OR output<br>* Differential alarm, change rate alarm, standby alarm and AND output can be offered on request.<br>Contact capacity: 100VAC, 5A (resistive load) |
| High-speed dotting | Dotting cycle - about 2.5 sec./point (at chart speed faster than 12mm/h)<br>The dotting cycle differs according to the chart speed when the chart speed is slower than 12mm/h. |
| Non-standard scale | Voltage-dividing input - Higher than 5VDC but lower than 60VDC (Built-in voltage divider - points fixed)<br>Current input - Lower than 50mA (Built-in resistors - point fixed, or external resistors) |
| Burnout | Higher-limit overshoot at input signal interruption (Except for voltage-dividing inputs and voltage/current inputs) |
| Time-axis synchronization | For 2 and 3-pen types, mechanical position of pens are adjusted to be on same time axis. |
| Math function | Addition/subtraction/multiplication, square root, logarithm, temperature/humidity (dotting type only) or integration (to be specified) |
| CE-marking | (Standards)<br>EN55011 Group 1 Class A, EN50082-2 (Industrial environment), EN61010-1 + A2<br>Rated power supply - 100 to 240VAC<br>Dotting type rear casing - Steel plate (add 1kg to standard models)<br>Reference junction compensation stability - ±5°C under EMC test environment<br>Alarm contact capacity - 240VAC 50mA (a contact Photo MOS relay) |

# BL 4-PEN HYBRID RECORDERS

BL SERIES
100mm Chart



The BL series 4-pen hybrid recorders using 100mm chart can directly read measured values at a glance on scale plates conforming to measuring inputs as well as digital display of the measured values.
The recorders offer convenient functions including multi-range function of input types, list printing & data printing functions and time-axis synchronization function.

BL □□□□□□□□□

- 1st pen input signals
- 2nd pen input signals
- 3rd pen input signals
- 4th pen input signals
  - 1: Thermocouple, DC voltage (Standard range)
  - 2: Resistance thermometer, 5V (Standard range)
  - 3: Thermocouple, DC voltage (Low range)
  - 4: Resistance thermometer, 5V (Low range)
- CE-marking (option)
  - –: Not provided
  - F: With CE-marking
- Communication interface (option)
  - N: Not provided
  - A: RS-422A
  - R: RS-232C
  - S: RS-485
- Time-axis synchronization (option)
  - D: Not provided
  - 2: Provided
- External drive + individual alarm output (option)
  - N: None
  - D: External drive
  - 1: 6 alarm outputs
  - 2: External drive + 6 alarm outputs

## GENERAL SPECIFICATIONS

Input signal: DC voltage ..... ±7mV, ±14mV, ±25mV, ±70mV, ±5V
DC current ..... Applicable by adding shunt resistors
Thermocouple ... B, R, S, K, E, J, T, N, Ni-NiMo, AuFe-Cr, PR5-20, PR20-40, WWRe5-26, WWRe0-26, Platinel, U, L
Resistance thermometer ..... Pt100, JPt100, Pt-Co

Measuring range: Setting of input types and ranges by key operation
Setting ranges differ according input types. (Standard ranges/low ranges)

Minimum setting range:
More than 2/5 of measuring range (Minimum 50°C span is necessary for resistance thermometer input.)

Decimal point position of scale:
Voltage input .... setting of 0 to 3 by key input
Temperature input .... setting of 0 to 1 by key input

Accuracy rating: Digital indication, printing
Thermocouple, resistance thermometer ..... ±0.3% of scale range ± 1 digit or ±1°C, whichever larger
DC voltage ..... ±0.2% of reference measuring range ± 1 digit
Analog indication ... ±0.5% of scale range
[At 23°C ± 2°C, Reference junction compensating accuracy is excluded for thermocouple input.]

Measuring cycle: About 125msec.

Temperature drift: ±0.01% of full scale/°C (equivalent to E.M.F. for thermocouple input)

Reference junction compensating accuracy:
K, E, J, T, N, Platinel ..... lower than ±0.5°C
R, S, Ni-NiMo, AuFe-Cr, WWRe5-26, WWRe0-26, U, L ..... lower than ±1.0°C

Chart paper: Fan-fold type, 114mm total width, 10m total length, 100mm effective recording width

Recording point: 4 points

Recording system: Analog recording .... Cartridge pen
Digital recording ..... Plotter pen

No. of measuring point:
4 points

Recording color: Analog recording ... 1st pen - red, 2nd pen - green, 3rd pen - blue, 4th pen - brown
Digital recording ... Purple

Chart speed: 1 to 599mm/h , 10 to 200mm/min optional setting

Digital printing: Fixed time digital recording, data printing, date/time/chart speed printing, scale printing, alarm occurrence/reset printing

List printing: Date/time, range setting, scale setting, decimal point of scale, unit, chart speed and fixed time digital recording setting contents are printed at request time by interrupting analog recording. (Analog indications overshoot lower limit.)

Analog indication: Scale plates and pointers

Scale plate: 0 to 100 equal divisions (Specified-division is possible.)
max. dual-scale, min. 80 equal divisions

Digital display: 7-segment LED, character height 8mm
1 digit ..... Pen No.
5 digits .... Data display -9999 to 99999

Rated power supply: 100 to 240VAC (free power supply)

Rated supply frequency:
50Hz/60Hz (selectable by DIP switch)

Maximum power consumption:
About 45VA

Working temperature range:
0 to 50°C

Working humidity range:
20 to 80%RH (No condensing is allowed.)

Weight: About 5.0kg

Note: For standard scales, options and external dimensions, please refered to the corresponding paragraphs.

*Specifications subject to change without notice.

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